

Claims

## We Claim:

- 1 1. A water-based drilling fluid comprising:
  - 2 a) a polymer latex capable of providing a deformable latex film on at
  - 3 least a portion of a subterranean formation; and
  - 4 b) water.
2. The water-based drilling fluid of claim 1 where the water comprises salt.
3. The water-based drilling fluid of claim 1 further comprising a precipitating agent.
4. The water-based drilling fluid of claim 1 further comprising a surfactant.
- 1 5. A water-based drilling fluid comprising:
  - 2 a) a polymer latex;
  - 3 b) a precipitating agent; and
  - 4 c) water.
6. The water-based drilling fluid of claim 5 where the water comprises salt and is a saturated salt brine.
7. The water-based drilling fluid of claim 5 further comprising a surfactant.
- 1 8. A water-based drilling fluid comprising:
  - 2 a) a polymer latex;
  - 3 b) a precipitating agent;
  - 4 c) a surfactant; and
  - 5 d) water.

9. The water-based drilling fluid of claim 8 where the water comprises salt.

1 10. The water-based drilling fluid of claim 9 where the salt in the saturated salt  
2 brine is selected from the group consisting of calcium chloride, sodium  
3 chloride, potassium chloride, magnesium chloride, calcium bromide, sodium  
4 bromide, potassium bromide, calcium nitrate, sodium formate, potassium  
5 formate, cesium formate, and mixtures thereof.

1 11. The water-based drilling fluid of claim 8 where the polymer latex is capable  
2 of providing a deformable latex seal on at least a portion of a subterranean  
3 formation and is selected from the group consisting of polymethyl  
4 methacrylate, polyethylene, carboxylated styrene/butadiene copolymer,  
5 polyvinylacetate copolymer, polyvinyl acetate/vinyl chloride/ethylene  
6 copolymer, polyvinyl acetate/ethylene copolymer, natural latex, polyisoprene,  
7 polydimethylsiloxane, and mixtures thereof.

12. The water-based drilling fluid of claim 8 where the precipitating agent is  
selected from the group consisting of silicates, aluminum complexes, and  
mixtures thereof.

13. The water-based drilling fluid of claim 8 where the surfactant is selected from  
the group consisting of betaines, alkali metal alkylene acetates, sultaines,  
ether carboxylates, and mixtures thereof.

14. The water-based drilling fluid of claim 8 where the polymer latex is present in  
the drilling fluid in an amount of from about 0.1 to about 10 volume% based  
on the total water-based drilling fluid.

15. The water-based drilling fluid of claim 8 where the precipitating agent is present in the drilling fluid in an amount of from about 0.25 to about 20 lb/bbl based on the total water-based drilling fluid.
16. The water-based drilling fluid of claim 8 where the surfactant is present in the drilling fluid in an amount of from about 0.005 to about 2 wt.% based on the total water-based drilling fluid.
17. The water-based drilling fluid of claim 9 where the salt is present in the drilling fluid in an amount of from about 1 wt.% to about saturation based on the total water-based drilling fluid.
18. The water-based drilling fluid of claim 8 where polymer latex comprises particles that average less than 1 micron in size.
- 1 19. A water-based drilling fluid comprising:
  - 2 a) from about 1 to about 10 volume% of a polymer latex selected from  
3 the group consisting of polymethyl methacrylate, polyethylene,  
4 carboxylated styrene/butadiene copolymer, polyvinylacetate  
5 copolymer, polyvinyl acetate/vinyl chloride/ethylene copolymer,  
6 polyvinyl acetate/ethylene copolymer, natural latex, polyisoprene,  
7 polydimethylsiloxane, and mixtures thereof;
  - 8 b) from about 0.25 to about 20 lb/bbl of a precipitating agent selected  
9 from the group consisting of silicates, aluminum complexes, and  
10 mixtures thereof;
  - 11 c) at least 1 wt.% of a salt selected from the group consisting of calcium  
12 chloride, sodium chloride, potassium chloride, magnesium chloride,  
13 calcium bromide, sodium bromide, potassium bromide, calcium  
14 nitrate, sodium formate, potassium formate, cesium formate, and  
15 mixtures thereof;

- 16           d)     from about 0.005 to about 2 vol.% of a surfactant selected from the  
 17                 group consisting of betaines, alkali metal alkylene acetates, sultaines,  
 18                 ether carboxylates, and mixtures thereof; and  
 19           e)     water making up the balance,  
 20     where the proportions are based on the total water-based drilling fluid.

- 1     20.    A method of inhibiting borehole wall invasion when drilling with a water-  
 2            based drilling fluid in a subterranean formation, the method comprising:  
 3            a)     providing a water-based drilling fluid comprising:  
 4                 i)     a polymer latex capable of providing a deformable latex seal on  
 5                 at least a portion of a subterranean formation; and  
 6                 ii)    water; and  
 7            b)     circulating the water-based drilling fluid in contact with a borehole  
 8            wall.
21.    The method of claim 20 where in providing the water-based drilling fluid, the  
 water comprises salt.
22.    The method of claim 20 where in providing the water-based drilling fluid, the  
 fluid further comprises a precipitating agent.
23.    The method of claim 20 where in providing the water-based drilling fluid, the  
 fluid further comprises a surfactant.

- 4     24.    A method of inhibiting borehole wall invasion when drilling with a water-  
 2            based drilling fluid in a subterranean formation, the method comprising:  
 3            a)     providing a water-based drilling fluid comprising:  
 4                 i)     a polymer latex;  
 5                 ii)    a precipitating agent; and  
 6                 iii)   water; and

7 b) circulating the water-based drilling fluid in contact with a borehole  
8 wall.

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25. The method of claim 24 where in providing the water-based drilling fluid, the water comprises salt and is a saturated salt brine.

26. The method of claim 24 where in providing the water-based drilling fluid, the water-based drilling fluid further comprises a surfactant.

1 27. A method of inhibiting borehole wall invasion when drilling with a water-  
2 based drilling fluid in a subterranean formation, the method comprising:

3 a) providing a water-based drilling fluid comprising:

4 i) a polymer latex;

5 ii) a precipitating agent;

6 iii) a surfactant; and

7 iv) water; and

8 b) circulating the water-based drilling fluid in contact with a borehole  
9 wall.

28. The method of claim 27 where in providing the water-based drilling fluid, the water comprises salt.

29. The method of claim 28 where the salt is selected from the group consisting of calcium chloride, sodium chloride, potassium chloride, magnesium chloride, calcium bromide, sodium bromide, potassium bromide, calcium nitrate, sodium formate, potassium formate, cesium formate, and mixtures thereof.

30. The method of claim 27 where in providing the water-based drilling fluid, the polymer latex is capable of providing a deformable latex seal on at least a portion of a subterranean formation and is selected from the group

consisting of polymethyl methacrylate, polyethylene, carboxylated styrene/butadiene copolymer, polyvinylacetate copolymer, polyvinyl acetate/vinyl chloride/ethylene copolymer, polyvinyl acetate/ethylene copolymer, natural latex, polyisoprene, polydimethylsiloxane, and mixtures thereof.

31. The method of claim 27 where in providing the water-based drilling fluid, the precipitating agent is selected from the group consisting of silicates, aluminum complexes, and mixtures thereof.
32. The method of claim 27 where in providing the water-based drilling fluid, the surfactant is selected from the group consisting of betaines, alkali metal alkylene acetates, sultaines, other carboxylates, and mixtures thereof.
33. The method of claim 27 where in providing the water-based drilling fluid, the polymer latex is present in the drilling fluid in an amount of from about 0.1 to about 10 vol.% based on the total water-based drilling fluid.
34. The method of claim 27 where in providing the water-based drilling fluid, the precipitating agent is present in the drilling fluid in an amount of from about 0.25 to about 20 lb/bbl based on the total water-based drilling fluid.
35. The method of claim 27 where in providing the water-based drilling fluid, the surfactant is present in the drilling fluid in an amount of from about 0.005 to about 2 vol.% based on the total water-based drilling fluid.
36. The method of claim 28 where the salt is present in the drilling fluid in an amount of from about 1 wt.% to about saturation based on the total water-based drilling fluid.

37. The method of claim 27 where in providing the water-based drilling fluid, the polymer latex comprises particles that average less than 1 micron in size.

1 38. A method of inhibiting borehole wall invasion when drilling with a water-  
2 based drilling fluid in a subterranean formation, the method comprising:

3 a) providing a water-based drilling fluid comprising:

4 i) from about 0.1 to about 10 vol.% of a polymer latex selected  
5 from the group consisting of polymethyl methacrylate,  
6 polyethylene, carboxylated styrene/butadiene copolymer,  
7 polyvinylacetate copolymer, polyvinyl acetate/vinyl  
8 chloride/ethylene copolymer, polyvinyl acetate/ethylene  
9 copolymer, natural latex, polyisoprene, polydimethylsiloxane,  
10 and mixtures thereof;

11 ii) from about 0.25 to about 20 lb/bbl of a precipitating agent  
12 selected from the group consisting of silicates, aluminum  
13 complexes, ether carboxylates, and mixtures thereof;

14 iii) at least 1 wt.% of a salt selected from the group consisting of  
15 calcium chloride, sodium chloride, potassium chloride,  
16 magnesium chloride, calcium bromide, sodium bromide,  
17 potassium bromide, calcium nitrate, sodium formate, potassium  
18 formate, cesium formate, and mixtures thereof;

19 iv) from about 0.005 to about 2 vol.% of a surfactant selected from  
20 the group consisting of betaines, alkali metal alkylene acetates,  
21 sultaines, ether carboxylates, and mixtures thereof; and

22 v) water making up the balance,

23 where the proportions are based on the total water-based drilling fluid; and

24 b) circulating the water-based drilling fluid in contact with a borehole  
25 wall.